P-8.3 Predict the resulting isotope of a given alpha, beta, or gamma emission.

Revised Taxonomy Levels 2.5 B Predict (infer) procedural knowledge

In physical science students were introduced to the concept of radioactive isotopes. Alpha, beta, and gamma emission may not have been covered.

It is essential for students to:

- Understand that a beta decay results when a neutron transforms into a proton and a beta particle.
- Understand that an alpha particle is a helium nucleus that consists of two neutrons and two protons.
- Predict the resulting isotopes from an alpha or beta decay when told which type of decay will occur.
  - **It not essential** that students understand neutrino or antineutrino emissions that may occur with beta decay.
- Understand that after a nucleus undergoes a radioactive decay it is often left in an excited state. The nucleus may undergo a second decay to a lower energy state by emitting one or more photons. The photons emitted in such a de-excitation process are called gamma rays which have a very high energy relative to the energy of visible light.
  - Understand that gamma emissions that come from excited nuclei do not change the identity of the isotope.

Assessment

The verb in this indicator is predict which means to draw a logical conclusion from presented information. In this case the students should be able to predict the resulting isotopes if they are told which type of decay will occur.

Because the indicator is written as conceptual knowledge, assessments should require that students understand the "interrelationships among the basic elements within a larger structure that enable them to function together." In this case, assessments should show that students can predict the products knowing the nature of alpha and beta particles and gamma radiation and how each type of decay would affect the nucleus.

.